

An Exploration of Women's Motivations for and Experiences of Egg Freezing for Social Reasons: A Systematic Review

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Attestation of authorship

“I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.”

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Abstract

Introduction:

The increasing trend in developed countries of women delaying childbearing has led to an increase in oocyte cryopreservation for non-medical reasons or social egg freezing (SEF), whereby women prolong their fertility by freezing their eggs for elective or social reasons. The aim of this systematic review was to gain an understanding of the motivations for and experiences of women who choose to undergo SEF.

Methods:

A systematic search of English language peer-reviewed journals of five computerised databases was conducted following PRISMA guidelines. No time restrictions were set. The five databases searched were MEDLINE and CINHAL Complete (using EPSCO Health as the host platform), Scopus, PsychINFO and Google Scholar with the aim to identify articles that examined women's motivations for and experiences of SEF such as "egg freezing", "fertility preservation" and "experience*". The databases were searched up until August 2, 2021. 588 studies were identified.

Results:

After applying inclusion criteria thirteen studies were examined in this review. Extracted data was analysed using thematic synthesis with prominent themes identified. The most common motivating factor was lack of a suitable partner while a feeling of running out of time and utilising SEF as a back-up plan or to buy options were prime considerations. While overall satisfaction with SEF was typically reported, both empowerment and loneliness were common experiences along with a need for support and honest information to ensure realistic expectations.

Conclusion:

The predominant reason women are electively choosing to freeze eggs is lack of finding a suitable partner with whom to have children and a sense of declining fertility. The resulting experience of freezing their eggs leads to a sense of empowerment and gratitude in having a back-up plan even if SEF might not be successful. There is a significant gap in current research with respect to New Zealand women who have undergone SEF, therefore future research into their motivations and experiences would be invaluable. It is apparent that both men and women should be given earlier information about fertility in order to be aware of age-related fertility decline.

KEYWORDS

Social egg freezing, elective egg freezing, oocyte cryopreservation for non-medical reasons, fertility, motivations, experiences.

Introduction

Historical background

It is well-documented that the number of women delaying motherhood in the developed world is on the rise (O'Brien et al., 2017). In New Zealand, the median age for women at the birth of their first child increased from 24.8 years in 1972 to 30.8 in 2018, although in the same year Māori and Pacific women were having their first children at slightly younger ages (27 and 27.6 years respectively) (Statistics NZ, n.d.). Evidence suggests however, that a woman's fertility decreases substantially after the age of 35. According to Saumet et al. (2018) for example, 6% of 20 to 24 year olds are at risk of infertility, rising to 64% at ages 40 to 44. By age 38 years, 26% of New Zealand women experience infertility (defined as the inability to become pregnant within 12 months of trying or having sought medical help to conceive) (Fertility Associates, n.d.), while Yatsenko and Rajkovic (2019) state that approximately 10% of women of procreative age are not able to achieve conception or carry to term. Similarly, research shows pregnancies at an advanced maternal age have increased risk of miscarriage and pregnancy complications including aneuploidy such as trisomy 21 (Down Syndrome) (Gosden, 1985; Hodes-Wertz et al., 2013; Magnus et al., 2019). Despite the increased risks, the upsurge in delayed partnering and parenthood may be attributed to modern societal and sociodemographic issues such as career-development, educational and economic factors (Johnston et al., 2020; Saumet et al., 2018). As a consequence, women may suffer age-related infertility when they ultimately attempt to conceive (Borovecki et al., 2018).

The practice of egg freezing arose in the 1980s in order to safeguard women's healthy eggs (oocytes) when confronted with a medical challenge such as cancer treatment that could leave them infertile. 'Oocyte cryopreservation' (OoC) or 'egg freezing' (EF) is a procedure using assisted reproductive technology (ART) to hyper-stimulate ovaries then collect, freeze and store a woman's eggs, saving them for IVF in the future, thereby potentially extending a woman's natural fertility (Johnston et al., 2020). Chen (1986) documented the first birth from a frozen oocyte in Australia in 1986 and since then developments have accelerated. Although egg freezing was initially cited as an experimental procedure, the label was retracted in 2012/13 by the

American Society of Reproductive Medicine [ASRM] and the European Society of Human Reproduction and Embryology [ESHRE] due to frozen oocyte pregnancy rates matching those using fresh eggs in an IVF context (Platts et al., 2020). The process of vitrification (rapid freezing) was a significant factor in this, as it brings about less internal structural damage and greater success rates post-thaw (Saumet et al., 2018). Clinical trials conducted by Cobo et al. (2010) indicate 90-95% of frozen eggs by the vitrification process survive thawing compared to 61% of slow-frozen eggs. Egg freezing is now also used as a method for healthy fertile women to preserve their fertility for non-medical reasons and deferred reproduction, both internationally and in New Zealand (Baldwin & Culley, 2020; Hodes-Wertz et al., 2013). This process is known as oocyte cryopreservation for non-medical reasons (OFNMR), non-medical egg freezing (NMEF), elective egg freezing (EEF) or social egg freezing (SEF) and is the focus of this review. The term social egg freezing (SEF) will be used in this review to describe the process.

According to Johnston et al. (2021) the USA has seen a mammoth increase in egg freezing cycles, some for imminent use and others for storage (+880% from 2010-2016) while figures from the Australian and New Zealand Assisted Reproduction Database (ANZARD), also show a dramatic rise (+311% in Australia/NZ from 2010 to 2015) (Johnston et al., 2021). The ESHRE Working Group on Oocyte Cryopreservation also reveal a substantial increase (Shenfield et al., 2017). In New Zealand, Fertility Associates NZ (n.d.) medical director Dr Mary Birdsall suggests the number of women freezing their eggs specifically for non-medical reasons is increasing and hundreds of eggs are frozen each year. Little is known however, about the factors underlying women's motivations alongside their experiences of egg freezing. International data relating to women who undergo SEF has been well documented with most in professional employment, single, over 35 years and well-educated (Cobo et al., 2016; Mertese & Pennings, 2011; Saumet et al., 2018). Data from an Australian study of 96 women suggests similar demographics for social egg freezers: 89% were employed professionally, 89.5% were single at the time of freezing their eggs, 84.8% were aged 35 or older and 90% had completed at least a bachelor's degree (Pritchard et al., 2017).

Motivations for SEF

In terms of motivations for SEF, research by Baldwin et al. (2019) suggests fear of running out of time, lack of the right partner or being unwilling to parent alone may be more significant than career goals as reasons for SEF. Pritchard et al. (2017) concur that the most frequent pretext for women in Melbourne was lack of partner or a partner unwilling to father children. Motivations reported in a UK study also include a

need to eschew guilt if potential childlessness were to be an issue and avoiding an imprudent relationship (Baldwin & Culley, 2020). In contrast, Platts et al. (2020) found that career advancement is viewed by the general public as an important motivation, with companies such as Apple and Facebook paying for the procedure for their staff (CNN, n.d.).

Regarding women's needs, the narrow scope of primary research regarding experiences of SEF suggests women underestimate the emotional challenge and find it anxiety-producing, particularly without a partner in the couples' world of in vitro fertilization (IVF) (Baldwin & Culley, 2020). Research to date suggests that women seeking SEF may have specific information needs, with many women asking for knowledge in the form of a national clinic databank or register, and locally through an array of media and materials such as webinars and brochures (Inhorn et al., 2019). Many also desire information specific to single women rather than couples, and clinics offering after-hours treatment (Inhorn et al., 2019).

Further, in terms of experiences of SEF, Isaacson and Daniluk (2020) report that some women experience a sense of personal empowerment and control over their reproductive agency and find the experience easier than expected. Data from Wafi et al. (2020) showed 39% of women experienced regret for not undertaking further cycles, with 68% indicating cost was a barrier to undergoing more cycles of EF. Isaacson and Daniluk (2020) reported that while some women felt lucky to have resources such as money and access, along with gratitude for the science enabling the process, others felt a sense of stigma attached to utilising this method.

Critical Issues

Unfortunately, data suggests that the majority of women freeze their eggs in their late thirties when optimal quality and quantity of eggs has already diminished (Cobo et al., 2016; Mertese & Pennings, 2011; Saumet et al., 2018). An egg freezing counselling tool created by Goldman et al. (2017) indicates the likelihood of pregnancy and live birth for a 37-year-old woman with 20 mature frozen oocytes is 75%, but only 37% for a 42-year-old. With only 10 frozen eggs the numbers drop significantly to 50% and 20% respectively. It should be noted however, that the use of this tool for predicting live births from EF needs a caveat as it was designed from retrospective data and has not been externally validated (Goldman et al., 2017). As mentioned, one of the main factors associated in cumulative live birth rate (CLBR) from thawed eggs, is the mother's age at the time of egg retrieval. Cobo et al. (2016) suggest a CLBR of 85% for women who undergo elective fertility preservation at a younger age, while freezing

eggs at age 36 or over, is barely 20%. Age may thus have a significant impact on outcomes, and thus experience of SEF.

Women under 35 with normal ovarian reserve typically collect about six to 15 eggs in a single cycle (Melbourne IVF Clinic n.d.) and investigations by Ben-Rafael (2018) suggest a mean of eight to 12 eggs, with studies revealing the average number of mature oocytes retrieved per cycle decreases with age. Investigations conducted by Seyhan et al. (2021) on 81 women with a higher mean age of 38.5 years revealed an average of only 7.5 collected eggs and just 5.48 mature eggs cryopreserved. This indicates it is likely older women will need to undergo more than one cycle to increase their chances of a live birth, leading to financial and emotional implications. Argyle et al. (2016) suggest studies have shown some women are not aware of their decline in fertility and are often already over the age of 35 before contemplating freezing their eggs. In the UK in 2016 only 32% of women undergoing EF were under the age of 36 (Platts et al., 2020). Research suggests the optimum time to freeze eggs is in a woman's late teens to twenties however this is seldom the time women are thinking about preserving their fertility (Jackson, 2016; Mesen et al., 2015). These factors combine to suggest that egg freezing is not as successful at a later age, thus it is vitally important to consider women's experiences and to what extent they were well counselled beforehand as well as supported through the process, including honest and clear-cut information about the likelihood of success versus disappointment as indicated by women's viewpoints mentioned earlier.

With the bulk of research with respect to SEF mainly in Europe and the USA, this review also aims to contextualise women's experiences and motivations against the backdrop of New Zealand's legislative frameworks and practices, as well as its bicultural and multi-cultural context. According to the Advisory Committee on Assisted Reproductive Technology [ACART] (n.d.) Māori perceptions surrounding ART are diverse and likely to vary between iwi, hapū and whanau, however there are central beliefs pertinent to te ao Māori tikanga such as protection of whakapapa and tino rangatiranga. Kaitiakitanga of a woman's eggs signifies they stay under her mana even when removed from her wharetangata (womb) and frozen (ACART, n.d.). Research by Glover (2008) suggests if ART is viewed as beneficial to the endurance of Māori as a unique culture and people, it will be supported by Māori, but there is limited research as to whether this would apply to SEF and delaying childbearing.

In summary it is already known that predominately, women who undergo SEF are in their late thirties, professional, well-educated and single. This systematic review is undertaken to review women's motivations and experiences, and to draw on these to inform the practice in Aotearoa. With limited studies on the motivations for and experiences of SEF there is a need to synthesise existing research to provide an overview of the field and identify any gaps in current research which may need to be addressed.

Value of the systematic review

Qualitative systematic reviews in health are becoming more common-place and aid in explaining personalised experiences and perspectives. Bearman and Dawson (2013) suggest qualitative reviews are subjective endeavours of engagement, judgement and systematic interpretation that embody the meaning of included studies to provide us with phenomenological insight into people's lived experiences, beliefs and attitudes. The Cochrane Collaboration's Qualitative and Implementation Methods Group demonstrates the significance and importance of qualitative research and its generation of rich, thick descriptions (Noyes et al., 2018). Gülmezoglu et al. (2013) state qualitative synthesis has a significant impact on groups such as the World Health Organisation (WHO) when forming international recommendations. Further, Seers (2015) argues that a rigorous qualitative review has an important position alongside quantitative methods as it brings together evidence from primary research to enable understanding of the 'why'. Mallet et al. (2012) cite efforts to embrace more qualitative evidence. Investigating women's experiences and motivations for SEF focuses on cultural and social phenomenology, therefore this systematic review falls under an experiential and qualitative category.

Munn et al. (2018) define a systematic review as a "robust, reproducible, structured critical synthesis of existing research" and suggest utilising distinct approaches and key components according to the type of review (p. 2). By following this framework, an interpretative paradigm is assumed within the approach to the synthesis of this review (Noblit & Hare, 1988). As such, the review seeks to grasp women's viewpoints, perceptions and meaning making surrounding their egg freezing journey and therefore the more standard PICOS framework (Participants, Interventions, Comparisons, Outcomes and Study Design) is not as suitable (Methley et al., 2014). Consequently, the mnemonic PICo will be employed as an approach to define eligibility criteria: Population, phenomena of Interest and Context (Munn et al., 2018). This will be discussed further in the methods section. This current review follows an interpretative

approach to identify knowledge and insights that may indicate innovative ways of understanding the phenomenon of SEF.

In summary, the purpose of this research and aim of the systematic review is to systematically identify and assimilate literature about women who are undergoing egg freezing for social reasons, to understand their motivations and experiences and to draw on these to reflect on policy and practice in Aotearoa, including with respect to Māori experiences of SEF. This knowledge may assist researchers and clinicians to develop client focused resources and systems to support women contemplating and undergoing SEF.

Methods

Eligibility Criteria

This systematic review has been written in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement which replaces the 2009 guideline for reporting systematic reviews (Page et al., 2021).

Eligibility criteria were defined following the PICO format: Population (women), phenomenon of Interest (egg freezing for social reasons) and Context (experiences of or motivations for social egg freezing) (Munn et al., 2018). As shown in Table 1 inclusion criteria specified that the article must be written in English and published in a peer-reviewed journal. The article must refer to Social or Elective Egg Freezing and include women's motivations and/or experiences. Articles including egg freezing for medical reasons were excluded along with surveys of attitudes of medical staff or researchers, and studies related to: egg donation, ovarian tissue cryopreservation, transgender instances, sperm banking and cost-efficiency.

Search Strategy and Information sources

This systematic search followed PRISMA guidelines for systematic reviews (Page et al., 2021). A bibliographic search was conducted in five online databases: MEDLINE and CINHAL Complete (using EPSCO Health as the host platform), Scopus, PsychINFO and Google Scholar. The last search on these databases was August 2 2021. No date or design limits were imposed as this review aimed to amalgamate all available data on the topic.

The search terms *"egg freezing" OR "oocyte cryopreservation" OR "elective egg freezing" OR "assisted reproductive technology", AND "non-medical reasons" OR "social reasons" OR "fertility preservation" AND "experience**"* were used with extra fields as well as the Boolean phrase AND, as shown in Table 1. The function of the quotation marks served to look for phrases not just words, and the search was enhanced by manual search of the reference lists of included studies to identify articles that may have been missed in the initial search.

Search systems utilise different indexing methods and databases. Boolean operators (AND, OR, NOT) enable searchers to link words via complex search strings whereas Google Scholar uses crawler-based automated software (Gusenbauer & Haddaway, 2020). This may be the reason Google Scholar retrieved some studies from New Zealand and Australia whereas other databases did not and was the motivation for including Google Scholar in this review. Booth (2016) argues qualitative synthesis is seldom endeavouring to run exhaustive searches but rather to find sufficient studies to explore patterns and obtain an unbiased group of studies, the search terms were deemed sufficient for such an outcome.

Table 1

Search and selection strategy for systematic review of motivations for and experiences of egg freezing for social reasons.

Databases searched	MEDLINE, CINHAI Complete, Scopus, PsychINFO, Google Scholar
Search keywords	<i>"egg freezing" OR "oocyte cryopreservation" OR "elective egg freezing" OR "assisted reproductive technology" AND "non-medical reasons" OR "social reasons" OR "fertility preservation" AND "experience**"</i>
Other sources	Snowball referencing through included studies
Inclusion criteria	(1) Peer-reviewed journal English language (no date or design limits) (2) Social or Elective Egg Freezing (3) Women's motivations and/or experiences
Exclusion criteria	(1) Medical egg freezing, surveys of attitudes of medical staff or researchers, egg donation, ovarian tissue cryopreservation, transgender instances, sperm banking and cost-efficiency.

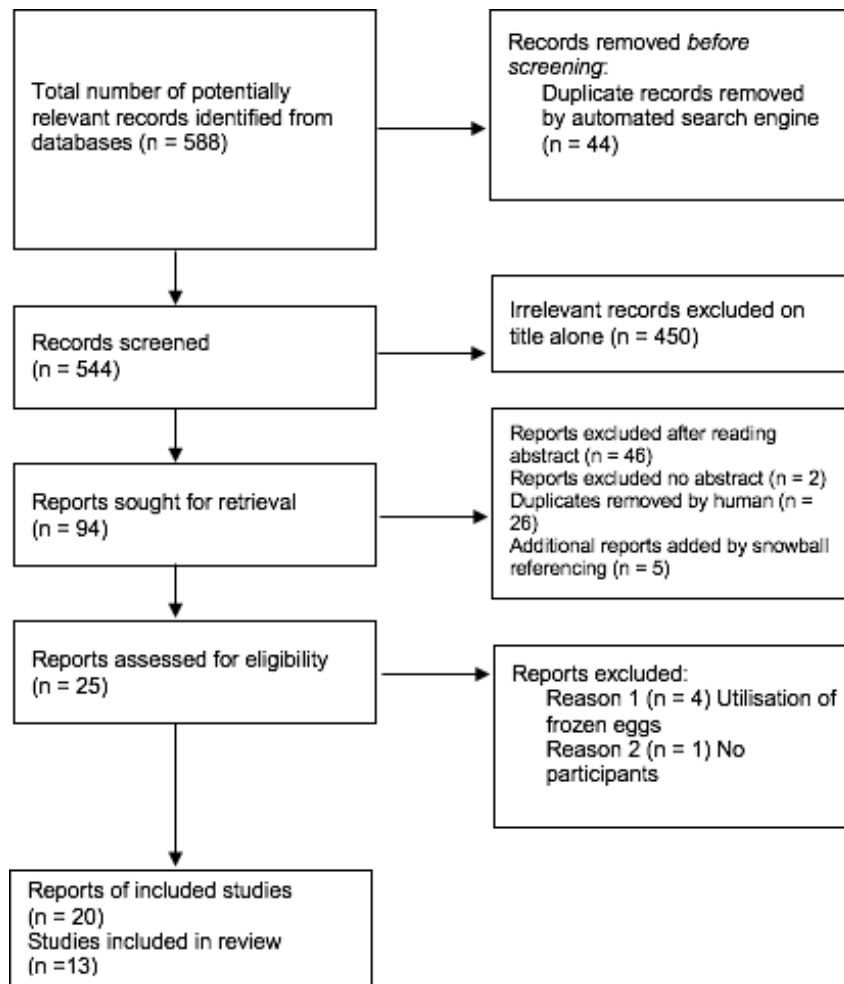
Selection process

Articles were searched in consultation with AUT library staff and independently reviewed by the first author J.H. based on eligibility criteria. MEDLINE and 'CINHAL Complete' yielded 311 studies (using EPSCO Health as the host platform), Scopus 120, PsychINFO 98 and Google Scholar 59, tallying 588 studies. Following the initial search 44 duplicate studies were removed by automated search engines. Each title was read by the author and 450 manuscripts were rejected based on title alone, where it clearly did not meet the criteria for inclusion. Of the 94 remaining studies a further 48 were excluded after reading the abstract including two without an abstract, and a further 26 duplicates removed by human effort as shown in Figure 1. An additional five studies were added from snowball referencing.

After reading the 25 articles, five were excluded due to discussion around utilisation of frozen eggs rather than a focus on experiences and motivation, bringing the total to 20 reports included in this review. Due to the extensive nature of the search, it is common for reviews to identify a number of reports utilising the same set of participants for a potentially appropriate study. According to the Cochrane Handbook for Systematic reviews (Li et al., 2020), studies, not reports, are the units of interest. In this review, instances where multiple articles report on the same study were collated together. After this process, a total of 13 studies are included in this review. The only exception included as a separate study was Inhorn et al. (2020) interviewing 14 women from the original 150 and conducting an ethnographic interview regarding religious beliefs. The motivation for this is due to a change in participant numbers. Second and third authors S.G. and K.V. were consulted regarding the screening process.

Figure 1

PRISMA flow diagram demonstrating the systematic search method for identification of articles for review



Data collection process

Key ideas were extracted from each study independently by the researcher J.H., cross checked by the second author S.G. and recorded in a spreadsheet, then built into a data extraction table. Each study was read in full and the extraction framework table was created as per the Preferred Reporting Items for Systematic Reviews Meta-Analyses (PRISMA) statement guidelines (Page et al., 2020) to include descriptive data of: (a) lead author, year and country, (b) journal (c) method, (d) sample size and participants (e) study aim and f) key findings.

Five studies appeared to meet inclusion criteria however after being read in full, were excluded:

1. *'Clinical outcomes and utilization from over a decade of planned oocyte cryopreservation'* (Leung et al., (2021), only focuses on the 68 women who returned to use their frozen eggs to create embryos and the study did not focus on their experience or motivations of SEF.

2. *'Elective egg freezing: what is the vision of women around the globe?'* (Nasab et al., 2020), literature review, no participants.

3. *'Elective oocyte freezing for nonmedical reasons: a 6-year report on utilization and in vitro fertilization results from a Swedish center'*. Wennberg et al., (2019).

4. *'Reproductive experiences of women who cryopreserved oocytes for non-medical reasons'*. Hammarberg et al., (2017). Numbers 3 and 4 focus on utilisation of frozen eggs rather than experiences and motivation for SEF.

5. *'Oocyte cryopreservation for social reasons: demographic profile and disposal intentions of UK users'*. (Baldwin et al., 2015), focuses on reproductive intention and disposal rather than experiences and motivation for SEF.

Study risk of bias assessment

The risk of bias and quality appraisal of the articles were assessed to enable quality assurance. The Critical Appraisal Skills Programme [CASP] (n.d.) method was utilised and can be summarised in three key points: What are the results? Are they valid? Will they help locally? This encourages the researcher to critically appraise the methodological rigour including relevance of recruitment, accurate data analysis and explanation of procedures. It was found that the 13 included studies all used rigorous methods and presented appropriate analyses of their results, however the majority of authors failed to mention critical examination of their own bias in relation to their role and influence on research questions (Critical Appraisal Skills Programme Systematic Review Checklist, 2021).

Synthesis methods

Studies were grouped using 'thematic synthesis' a process developed from thematic analysis techniques in primary research by Thomas and Harden (2008) and is especially useful when examining multidisciplinary datasets and synthesising numerous studies across the qualitative-quantitative divide (Boyatzis, 1998). Synthesis of the mixed methods used in this review required the converging of different factors and a way of 'seeing' the data prior to interpretation (Boyatzis, 1998). It comprises three stages: text coding, forming descriptive topic frameworks and producing analytical themes. Thematic codes are integral to thematic synthesis and can be

identified from the data (inductive) or pre-specified (deductive), while an integrated approach employs both approaches (Cruzes & Dyba, 2011; Gough et al., 2012b; Snilstveit et al., 2012). Through experimentation with a number of methods Thomas and Harden (2008) advocate the potential of thematic synthesis to inform policy and practice by linking a wide range of individual experiences and perspectives without losing their fundamental intricacy or context. Likewise, Gough et al. (2012a) suggest thematic synthesis is a procedure to organise a “systematically grounded” synthesis regardless of perspective or methodology (p. 190.).

The findings of the primary studies were scanned line-by-line for patterns and given a code, this was followed by the construction and development of descriptive and analytical themes. Cruzes and Dyba (2011) suggest phases of developing themes can overlap somewhat. Coding requires discernment and good judgement and is not merely assigning a label, but rather intuitively interpreting what data ‘look and feel like’ (Cruzes & Dyba, 2011). Descriptive themes describe the totality of what the primary studies are saying and capture aspects of the phenomenon of interest. The analytical themes transform the data into a hypothesis or new theory from the author’s interpretation of what is going on that may not have been reported in the primary studies, and thus create recommendations as a new interpretation. This process shares some traits with grounded theory and meta-ethnography using constant comparison and reciprocal translation (Cruzes & Dyba, 2011). The review is also supplemented with personal communication in the form of emails from staff members of NZ SEF clinics, and these comments will be introduced in the discussion to compare results of the systematic review to the NZ context.

Thorne et al. (2004) reason thematic synthesis illuminates details and preserves differences, while Dixon-Woods et al. (2005) suggest it is an ideal way of integrating concepts from primary studies. Gough et al. (2012) state aggregation by collectively combining individual studies entails a more detailed and accurate understanding of the phenomenon. Finally, Paterson (2012) states that the pulling together of similarities from individual studies to identify prevailing and emergent themes has the potential for more generalisability of the research findings.

Results

Study selection and characteristics

Thirteen studies were identified in this systematic review and focused on participants' motivations for and experiences of SEF. Despite variation in research question, quality, design, sample characteristics and size it was feasible to identify dominant themes from the thirteen studies. The study participants, sample size, method, aim and key findings are shown in Table 2. This table shows each of the twenty articles that reported on the thirteen studies included in the review. The thirteen studies were conducted in a range of regions, including the USA ($n = 4$), UK ($n = 2$), Turkey ($n = 2$), Canada ($n = 1$), Australia ($n = 1$), Belgium ($n = 1$) two studies were a binational comparative study between Israel and USA ($n = 2$). The dataset was compiled following review of all studies and coding of relevant features.

As expected, across the thirteen studies the majority of participants reported being single and the mean age of women was 36.85 years at the time of SEF. These demographics align with the expectations set out in the introduction. Table 2 shows that women were predominately white middle class and held professional or managerial positions. 95% had at least a bachelor's degree and almost half held post-graduate degrees. The dates of freezing ranged from 1999 – 2018.

The most common methods used to obtain details for the reports were semi-structured interview ($n = 10$) followed by anonymous email/postal survey ($n = 2$), retrospective cohort survey ($n = 2$), single-site cross-sectional anonymous survey ($n = 2$), open-ended in depth audio-recorded interviews ($n = 1$), cohort survey study ($n = 1$), ethnographic interview ($n = 1$) and retrospective cross-sectional survey with case-note review ($n = 1$). Table 2 indicates whether the analysis in the studies were qualitative, quantitative or both, as well as the types of questions asked and whether there was free-text space for further comments. Questions involved a range of open and closed questions. Studies with response rates varied from 38% to 85% (Greenwood et al., 2018; Hodes-Wertz et al., 2013; Jones et al., 2020; Pritchard et al, 2017; Seyhan et al., 2021; Wafi et al. 2020 and Yee et al., 2021).

Table 2

Characteristics and aims of reports about studies of users of social egg freezing (SEF).

Study	Lead author(s), year, country of study.	Journal	Method	Sample Size (n) and participants characteristics	Report aim	Key findings
1.	Baldwin & Culley, 2020, UK	Human Fertility	Semi-structured in-depth open ended, non-directive interviews lasting from 40 mins – 3 hours (average = 1 hr 40min). Face-to-face (n = 16), video (n = 9), telephone (n = 6). Qualitative.	31 women: Recruited from British fertility clinics (n = 7), online forums (n = 20) and participant referrals (n = 4). Mean age at SEF 37 years (64% b/w 36 - 39). 32 - 44 years age range. Single/unpartnered (84%). All heterosexual. All had at least a degree. Post grad (39%). Predominately: White middle class. Nationality 58% British, 23% American, 19% other. Religion: 26% Christian, 10% Jewish, 6% Muslim, 10% Spiritual, 48% No Religion. Occupation Professional /Managerial 74%, Intermediate 23%, Self-employed 3%.	Women's experience of the process of SEF and interaction with clinics	Women's motivations shaped their experiences. 1. Absence of suitable partner to experience genetic motherhood. 2. Running out of time to find a partner. 3. Not wanting to parent alone. 4. Avoid feelings of regret and blame. 5. Prevent self from entering unwise relationship i.e. 'panic partnering'. Success defined by egg retrieval and good number of eggs for storing, surviving thawing and likelihood of baby. Awareness of perception of 'risk'. Sense of 'going it alone' and need for further support.

Study	Lead author(s), year, country of study.	Journal	Method	Sample Size (n) and participants characteristics	Report aim	Key findings
1.	Baldwin, 2018, UK	Sociology of Health & Illness	Semi-structured in-depth open ended, non-directive interviews lasting from 40 mins – 3 hours (average = 1 hr 40min). Face-to-face (n = 16), video (n = 9), telephone (n = 6). Qualitative.	31 women: Recruited from British fertility clinics (n = 7), online forums (n = 20) and participant referrals (n = 4)	Women's factors for motivation and accounts of SEF and experience of reproductive delay	1. Doing everything possible (self-actualisation and responsibility. Taking action) 2. Fear of future regret 3. Heteronormativity 4. Being ready to parent when can execute it well with a 'hands on father'.
1.	Baldwin et al, 2019, UK	Journal of Psychosomatic Obstetrics & Gynecology	Semi-structured in-depth open ended, non-directive interviews lasting from 40 mins – 3 hours (average = 1 hr 40min). Face-to-face (n = 16), video (n = 9), telephone (n = 6). Qualitative.	31 women: Recruited from British fertility clinics (n = 7), online forums (n = 20) and participant referrals (n = 4)	Qualitative exploration of women's motivations for use of SEF	Motivations: 1. "Running out of time". 2. Lack of suitable partner. 3. Fear of regret and blame in the future. 4. Critical event as opposed to motivation prompting SEF (e.g. relationship breakdown). 5. Several women emphasised career was not the issue.
1.	Baldwin, 2017, UK	Sociological Research Online	Semi-structured in-depth, open ended, non-directive interviews lasting from 40 mins – 3 hours (average = 1 hr 40min). Face-to-face (n = 16), video (n = 9), telephone (n = 6).	31 women: Recruited from British fertility clinics (n = 7), online forums (n = 20) and participant referrals (n = 4)	Examine women's accounts of SEF and how this shaped reproductive intentions	Clearly conveyed that career had not influenced them to freeze their eggs. Desire to 'do other things first' before parenthood. Stability and security. Importance of the right partner.

Study	Lead author(s), year, country of study.	Journal	Method	Sample Size (<i>n</i>) and participants characteristics	Report aim	Key findings
			Qualitative.			Motherhood not assured because of wanting to do “in the right circumstances, at the right time, with the right person”
2.	Carrolle, 2018, USA	Culture, Health & Sexuality	Semi-structured interviews either face-to-face or telephone. Qualitative. Participants identified using medical centre databases.	16 women who underwent SEF in Midwest (<i>n</i> = 8) and East Coast (<i>n</i> = 8) regions of USA. Mean age of 35 years at time of egg freezing (range 30-41 years), 67% single. All heterosexual. All at least a bachelor degree. 93% post grad. 80% White, 20% Indian/Asian. All employed.	How women negotiate and make sense of the decision for SEF	1. 'Freezing for love and having their own healthy baby' i.e. not for selfish reasons but yet to find a committed heterosexual partner. 2. Financial commitment – counting the cost and counting eggs. 3. Freezing for anticipated committed coupledom /nuclear family. 4. Experience reduced pressure to find romantic partner. 5. Feel enterprising and responsible - bio-preparedness by freezing younger eggs. 6. Women were aware of uncertain success of egg freezing.
3.	Gocmen & Killic, 2018, Turkey	European Journal of Women's Studies	Semi-structured interviews. Qualitative.	21 women: Istanbul private fertility clinic (<i>n</i> = 18), personal contacts (<i>n</i> =3). All Turkish citizens, two living in US at the time.	Social context and women's emotional response to aging triggering SEF	Women do not freeze their eggs simply to delay motherhood, nor for more time to pursue education/career. Empowerment - feel relieved, relaxed and confident, having a choice, making an

Study	Lead author(s), year, country of study.	Journal	Method	Sample Size (n) and participants characteristics	Report aim	Key findings
				Median age = 40 yrs. All employed professionals. 95% at least bachelor degree. One third post grad. 71% single.		investment, gaining time, minimizing risk and perceiving a positive effect on current or future relationships. Affordable for those with financial resources.
3.	Kilic & Gocmen 2018, Turkey	Social Science & Medicine	Semi-structured interviews. Qualitative.	21 women: Istanbul private fertility clinic (n = 18), personal contacts (n=3). All Turkish citizens, two living in US at the time	Rational calculation, personal beliefs in women's decisions and experiences of SEF	Deciding to freeze after given information about low ovarian reserve. Don't want to rush into a wrong relationship because of fear of "biological clock". Appeal to beliefs and fate especially if do not retrieve many eggs. Aware that odds are not high.
4.	Greenwood, 2018, USA	Fertility and Sterility	Email retrospective cohort quantitative and qualitative survey created by a panel of experts following exploratory qualitative pilot interviews. Survey items were tested thoroughly in a small number of volunteer patients and topic experts. Likert-type scales were used with questions such as "I felt	201 women who underwent SEF 2012-2016. Setting: academic centre in the US. 41.3% response rate from those who received the invitations. Mean age = 36.5 yrs. 63% Caucasian, 78% graduate or prof degree. 66% income over \$100,000. 76% single. 96% heterosexual. Age range 24.7 - 44 years.	Satisfaction of SEF and decision regret and subjective attitudes of satisfaction.	Lower number of eggs frozen were more likely to experience regret. Higher perceived emotional support was associated with lower decision regret scores. Need to discuss this in pre-counselling. Clinicians need to guide awareness of probabilities, possibility of needing more than one cycle expected live birth rate.

Study	Lead author(s), year, country of study.	Journal	Method	Sample Size (<i>n</i>) and participants characteristics	Report aim	Key findings
			adequate emotional support during the process”.			
5.	Hodes-Wertz, 2013, USA	Fertility and Sterility	Anonymous email/postal survey. 30 multiple choice questions intended to elicit more than one response with space for comments. Quantitative survey.	183 women who underwent SEF 2005-2011 at a New York Fertility Centre. 38% response rate from those who received the invitations. Mean age = 38 years. 80% White, 11% Asian, 4% Hispanic, 4% Asian American. 84% single at time of SEF	Women's beliefs, priorities and attitudes regarding SEF	88% had not had children earlier because lacked a partner. 83% said media gave impression that natural conception and motherhood viable option at older age. 53% said the experience was empowering. 36% said empowering and anxiety producing . 79% wished underwent EF at earlier age. Most common reason for not undergoing EF earlier was unaware technology was available (63%); 16% were not ready, 15% were not concerned about reproductive future and 14% could not afford it.

Study	Lead author(s), year, country of study.	Journal	Method	Sample Size (n) and participants characteristics	Report aim	Key findings
6.	Inhorn, 2018, Israel/USA	Reproductive Biology and Endocrinology	Semi-structured ethnographic qualitative interviews audio-recorded in person, video or phone. Average length 1 hour (ranged from 0.5 – 2 hours).	150 women (114 from 4 IVF clinics in US, 36 from 3 IVF clinics in Israel. Women who have undergone at least one cycle of SEF). Average age = 36.3 years (36.6 in US, 36.2 in Israel). 97% at least bachelor degree. (72% higher qualification) 85% single. 2 US women bisexual. 1 Israeli women lesbian.	Socio demographic factors leading healthy women to pursue SEF	Nearly 99% were pursuing SEF b/c of ongoing partnership obstacles. Lack of stable partnership with a man who also wanted to have children was the primary motivation in US and Israel. Only two of 150 chose EF for career related purposes.
6.	Inhorn, 2018, Israel/USA	Journal of Assisted Reproduction and Genetics	Semi-structured ethnographic qualitative interviews audio-recorded in person, video or phone. Average length 1 hour (ranged from 0.5 – 2 hours).	150 women (114 from 4 IVF clinics in US, 36 from 3 IVF clinics in Israel. Women who have undergone at least one cycle of SEF).	Specific pathways that lead women to freeze their eggs for social reasons	Skewed gender demographics, with deficit of males at same educational and professional level as females, self-blame. Being single is the primary reason. Career planning least common pathway (2%) Single mother pursuing as a last resort (4%)
6.	Inhorn, 2019, Israel/USA	Journal of Assisted Reproduction and Genetics	Semi-structured ethnographic qualitative interviews audio-recorded in person, video or phone. Average length 1 hour (ranged from 0.5 – 2 hours).	150 women (114 from 4 IVF clinics in US, 36 from 3 IVF clinics in Israel. Women who have undergone at least one cycle of SEF).	Women reflect on their experiences of SEF and quality of care	1. IVF clinics need to be acutely sensitive to the needs of single SEF women. 2. SEF women want timely info and direct referral. Limited information from general gynaecological community.

Study	Lead author(s), year, country of study.	Journal	Method	Sample Size (<i>n</i>) and participants characteristics	Report aim	Key findings
						<p>3. Cost - even those who could afford it felt that affordability would increase accessibility for SEF to all women.</p> <p>4. Good practice guidelines needed for patient-centred care. Greatest desire is for information from clinics. Most experiences positive and hopeful, grateful for SEF, praising it as a new fertility preservation option. Quite satisfied with care. Desire to find a committed male partner with whom to pursue parenthood</p>
7.	Inhorn, 2020, Israel/USA	Social Science & Medicine	<p>Ethnographic interview</p> <p>All interviews followed an identical semi-structured open-ended interview guide.</p> <p>Audio-recorded in person, video or phone.</p>	<p>14 women from 150 above, who self-identified as 'religious', 'observant' or 'practising' (US <i>n</i> = 11, Israeli <i>n</i> = 3)</p>	<p>How religiously observant women's standpoints affected their SEF decision</p>	<p>Turned to SEF at a similar age across three faith traditions.</p> <p>1. Faced issue that religious men weren't educated and vice versa. Right mate was elusive. Freezing eggs meant could still search for right mate.</p> <p>2. Assumed to be too old to bear children or not enough children, so stigma. SEF helped reduce anxiety and give reprieve.</p>

Study	Lead author(s), year, country of study.	Journal	Method	Sample Size (<i>n</i>) and participants characteristics	Report aim	Key findings
8.	Isaacson, 2020, Canada	Canadian Journal of Counselling and Psychotherapy	Open-ended in depth audio- recorded interviews (3 remotely others in person). Interview length ranged from 1.5 – 2 hours. Qualitative. Examples of questions: How do you understand and make sense of your experience of egg freezing?” “If you had it to do over again, would you still make the same decision to freeze your eggs and would you do anything differently?” Hermeneutic phenomenological methodology	6 women living in Canada who had undergone SEF, fluent in English. Average age = 35.7 years. Range 28 – 40 years. Heterosexual. Middle class. All bachelor degree 50% post grad. 67% = White, 33% = Multiracial 83.3% Single	Meaning and experience of SEF for the purpose of delaying child- bearing	3. Some catholic women exert proactive discretion and defy teachings. Women from all 3 faiths were willing sometimes to bypass restrictions of their religion. Sense of reducing the pressure to find the right partner with whom to conceive naturally. Reduce risk of future infertility, increase chance of having child when ready. Back-up plan. Empowered, step in the right direction. Take control of your life and increase chance of having a child in the future. Want more information available to younger women. Knowledge about their fertility status an important part of SEF. The use of the term SEF may not accurately represent the experiences of women who undergo this fertility preservation method. Reproductive counselling important to help relieve sense of social stigma

Study	Lead author(s), year, country of study.	Journal	Method	Sample Size (n) and participants characteristics	Report aim	Key findings
9.	Jones, 2020, UK	AOGS (Acta Obstetricia et Gynecologica Scandinavica)	Cross-sectional survey 45 questions. Electronic questionnaire. Retrospective case-note review concurrently to ascertain some data. “At the time of freezing your eggs, how comprehensive did you feel that the information you received with regards to your fertility was?” “At the time of freezing your eggs, was it explained to you that there could be chance of treatment failure in the future and that a future livebirth could not be guaranteed?”	85 women from fertility clinic in the UK who underwent SEF between 2008 and 2018. 85% response rate. Average age = 37 years. 71% single. Caucasian 78.8%. 92% Higher education. 56% Post Grad. 93% full time or self-employed.	Motivations, perceptions of women who have undergone SEF	Most frequent reason is not having a partner. Financial stability. 28% said career aspiration also influenced motivation, while 59% stating career was not involved in their decision at all. Realistic counselling is essential to help manage expectations (especially risk of treatment failure) and poor perception of counselling seems to increase decision regret. It is a reproductive gamble. Storing eggs at a younger age optimizes outcomes. However limits on storage may be an issue
10.	Pritchard, 2017, Australia	Journal of Reproductive and Infant Psychology	Anonymous postal survey. Study-specific questionnaire. Questions included fixed response, choice from selection of answers and ability to describe and free-text comments,	96 women who had undergone SEF at a Melbourne IVF centre between 1999 to 2014. Response rate of 53%. (193 women invited) Median age= 37.1 years. 93% private health insurance.	Characteristics, circumstances and reasons for SEF	1. Not having a partner/ partner unwilling to be a father. 2. Considering single parenthood but wanted time to prepare financially, emotionally socially. 3. Avoid future regret. 4. Ovarian reserve low 5. Hope in technology.

Study	Lead author(s), year, country of study.	Journal	Method	Sample Size (n) and participants characteristics	Report aim	Key findings
			including questions about reasons for cryopreserving oocytes. Questionnaire pilot-tested by five women.	90% bachelor's degree. 89% employed in professional or managerial occupation. 89.5% single. Average of 13 eggs.		No evidence found to support idea women were delaying motherhood because of personal ambition, to achieve financial security or for selfish reasons.
11.	Seyhan, 2021, Turkey	Reproductive Sciences	Cohort survey study. Questionnaire included single multiple choice and closed questions as well as free-text comments. Conducted by telephone. "Why did you decide to freeze your eggs?" "Was there anyone to support you before and during the treatment?" "Were you satisfied with the quality of care during treatment?". "What was the most difficult part of the treatment?".	81 women who underwent SEF at an academic medical centre in Turkey between Jan 2015 - June 2016. Response rate of 61%. Mean age = 38.5yrs 100% at least bachelor degree.	To evaluate experiences, expectations and awareness of women SEF	Anxiety and injections the most difficult part of the experience. Should be regarded as special population with no or inadequate support therefore a strong patient-provider relationship should be implemented. Major complaint poor communication between Dr and patient. Overestimation of natural and IVF-assisted reproductive potential. Overestimation of success by women who received comprehensive counselling prior to treatment. Many women did not retain information given. Using graphs seems to give reality of number of eggs needed to achieve blastocyst at a given age. Using visual information led to better recall

Study	Lead author(s), year, country of study.	Journal	Method	Sample Size (n) and participants characteristics	Report aim	Key findings
						of medical info. Cost and time prevent women from another cycle.
12.	Wafi, 2020, Belgium	RBMO (Reproductive Bio Medicine Online)	Email retrospective questionnaire-based cohort study. Questions developed from previous research survey. Including questions about overall satisfaction rate, consideration of undergoing treatment again.	138 women who completed at least one round of EF in a single tertiary university-based fertility centre in Belgium between 2009 - Sept 2016 and responded to emailed questionnaire. 57% initial response rate however included questionnaire response rate = 40.5% Mean 35.7 +/- 0.9 Years. All bachelor's degree. 15% post grad 1% bisexual. 83% single when froze eggs. 6% employers coverage. 98% Caucasian.	Reproductive attitudes and experiences of women who underwent SEF	Buying time in order to find the right partner is the main reason for SEF. 7% experienced physical side effects. 39% regretted not undergoing more cycles. 68% would have performed more cycles if cheaper. Low return rates despite high level of satisfaction. 21%(13 out of 61) said they had achieved a live birth through IVF using their frozen eggs.
13.	Yee, 2021, Canada	Journal of Assisted Reproduction and Genetics	Single-site, retrospective, cross-sectional anonymous survey. Online. 52 closed questions, 2 open. Additional free-text	86 Canadian women who had competed at least one EF cycle between 2012-2018 at a Canadian academic IVF centre.	Quality decision making in SEF	Main influence in deciding to seek EF consultation. 1. Want back up plan against age related fertility decline, 2. remove biological clock pressure. 3. being single.

Study	Lead author(s), year, country of study.	Journal	Method	Sample Size (<i>n</i>) and participants characteristics	Report aim	Key findings
			<p>space for comments on 5 questions.</p> <p>Questions included whether the woman would make exactly the same decision again or make some changes.</p>	<p>49.5% initial response rate, included questionnaire response rate = 43%</p> <p>Mean age 35.7 +/- 2.4.</p> <p>76.8% single.</p> <p>95.3% heterosexual.</p> <p>66.3% White</p> <p>93% degree</p> <p>65% post grad</p>		<p>Main concerns in deciding to undergo EF: 1. Cost, 2. Confidence in fertility Dr/clinic, 3. Success rate of EF based on clinical profile.</p> <p>61.2% thought decision making process was easy. 60.5% would make the same decision. 34.9% same but with some changes. such as freeze oocytes earlier. 30.2% sought info from more than one IVF clinic before freezing eggs. 59.3% spent about a month to make decision after consultation, while 20.9% spent 3 months. Some changes women would make if doing it again: Freeze eggs earlier; do another freezing cycle; freeze eggs and embryos; seek more social support; seek more counselling; be better prepared emotionally.</p> <p>Respondents who would have done it the same had a significantly higher 'informed choice' score. Correlations between decision difficulty, decision regret and informed choice. 94.2% =</p>

Study	Lead author(s), year, country of study.	Journal	Method	Sample Size (<i>n</i>) and participants characteristics	Report aim	Key findings
						Absolutely or most likely recommend to friends and fam.
13.	Yee, 2021, Canada	RBMO (Reproductive Bio Medicine Online)	Single-site, retrospective, cross-sectional anonymous survey. Online. 52 closed questions, 2 open. Additional free-text space for comments on 5 questions. Questions included whether the woman would make exactly the same decision again or make some changes.	86 Canadian women who had completed at least one EF cycle between 2012-2018 at a Canadian academic IVF centre. 49.5% initial response rate however included questionnaire response rate = 43%	Motivations, life circumstances of women who undertook SEF	Called it planned oocyte cryopreservation (POC) 84.9% expressed strong desire for motherhood. Strong desire to have a child within shared genetic parenthood relationship. 20% respondents reported high family pressure and 11.8% high peer pressure to have children. 74.6% using eggs contingent on life stability and 67.1% contingent on status of relationship. Least influential decision for using eggs: Career development (13.1%) workplace setting (10.9%).

Research design and risk of bias in studies

A combination of interview or questionnaire research designs have been used as shown in Table 2. The majority of studies used qualitative interviewing to consider women's motivations and experiences. It would seem that only one of the thirteen studies (Isaacson and Daniluk, 2020) adequately considered and critically examined their own bias between researcher and participants. Furthermore another four studies did not overtly justify their research design (Carroll and Krolokke, 2018; Hodes-Wertz et al., 2013; Jones et al., 2020; Seyhan et al., 2021). Moreover, a number of the sample sizes were relatively small, particularly Isaacson and Daniluk's (2020) sample of only six individuals. However as can be seen in Table 2, the number of participants ranged from 6 to 201, with 8 studies having over 80 participants. Similarly several articles did not provide an in-depth description of their analytical process therefore it is uncertain if their data analysis was rigorous (Carroll and Krolokke, 2018; Seyhan et al. 2021; Wafi et al. 2020). Another element of bias was noted with missing data (Carroll and Krolokke, 2018) and a statistical error in percentage calculations of education levels (Yee et al., 2021). It would seem that the overall credibility of the studies included in this review generated trustworthiness and usefulness, such as those by Göçmen and Kilic, 2018 and Greenwood et al. 2018 who both gave in-depth descriptions of their analyses. The Critical Appraisal Skills Programme [CASP] (n.d.) was utilised to evaluate quality, trustworthiness and relevance of the studies included in this systematic review. All studies used recruitment strategies appropriate to their research and explained why they had selected their participants.

A challenge of thematic synthesis is defining the 'findings' of the primary studies (Gough et al., 2012). Reviews can be selective in this, with some authors taking only the themes identified or what participants have said, while others use the authors' conclusions as well. The present review adopted the second approach, allowing the studies' conclusions to be incorporated as results. In order to ensure a transparent approach to the systematic analysis the spreadsheet of data extraction has been kept as a record, as suggested by Gough et al., (2012).

Themes from general findings

Themes from general findings were divided into motivations and experiences to represent women's reasons for pursuing SEF and their experiences of the process (see Table 3). Within the motivations domain, five themes were identified including lack of a partner with whom to conceive a child and a feeling of running out of time due to

the ticking of their biological clock. A further seven themes were ascertained in the experience domain including how women felt empowered by the process or experienced isolation and apprehension.

Table 3

Themes identified regarding women's motivations for and experiences of social egg freezing.

Motivation	Experience
Absence of suitable partner	Empowerment
Biological clock ticking	Loneliness, anxiety and stigma
Back-up plan	Overall satisfaction
The ideal of the heteronormative nuclear and genetic family	Managing expectations
Buying options	Cost
	Need for information
	Decision regret

Motivations

Five subthemes related to motivations were identified: absence of suitable partner, biological clock ticking, back-up plan, the ideal of the heteronormative nuclear and genetic family, and buying options.

Absence of suitable partner

The synthesis of the general findings in the 13 studies identified that the overwhelming majority of women who froze their eggs were not in a relationship or reported not having been able to find someone who would be committed to being parents together. Some women reported finding it hard to find a potential partner with the same aspirations and desires, and who were keen to commit to a relationship and parenting (Baldwin, 2019). Eleven out of the 13 studies suggested one of the main motivating factors was lack of a perceived suitable partner, for example Hodes-Wertz et al. (2013) found 88% of their participants had not had children earlier as they lacked a partner, and Inhorn et al. (2018) found nearly 99% of women in their study were pursuing SEF because of ongoing partnership obstacles. Only one study – Greenwood et al. (2018) did not mention lack of partner, however their focus was about decision regret rather

than motivations, while Seyhan et al. (2021) reported only 40% cited absence of a male partner as the main motivation, closely behind anticipated age-related fertility decline at 42%. For some women, the freezing of their eggs was done in a bid to avoid making a wrong decision in choosing the wrong partner or to avoid 'panic partnering' (Baldwin et al., 2018; Kilic & Göçmen, 2018).

As well as those who had not found the right partner, some women underwent SEF following a relationship breakdown. 25% of women in one study froze their eggs following a long-term relationship break up and saw this as a way to move forward and try to safeguard their remaining fertility (Inhorn et al., 2018).

Biological clock ticking

The concern of running out of time to conceive and age-related fertility decline were central motivations for many women. The very real fear that they might not actually be able to pursue motherhood was a predominant concern for all women in Baldwin's (2019) study. Yee et al., (2021) and Göçmen and Kilic, (2018) also found removing the perceived biological clock pressure was one of the main motivations in their studies. It allowed their participants a sense of not needing to rush and reduced the sense of panic that they might be running out of time or under pressure to make a decision they felt they were not ready to make (Isaacson & Daniluk, 2020).

Back-up plan

Many women use SEF as a back-up plan to avoid feeling future regret and blame and a way to evade potential forthcoming disappointment (Baldwin, 2020; Isaacson & Daniluk, 2020). Yee et al. (2021) utilised a 5-question standardized subscale to look at decision considerations and showed the highest rated factor above neutral was wanting to have a 'back-up plan against age-related fertility decline' (4.7 +/- 0.7). Carrolle and Krollokke, (2018) reported that for the women in their study, the knowledge of a back-up plan did not completely reduce uncertainty about their future fertility, but gave them 'a chance' and helped alleviate the 'regret factor', thus helping them engage in 'responsible reproductive citizenship'.

Despite the expense, women viewed SEF as a back-up plan similar to a future investment or a deposit in a bank even though they might never use their stored eggs (Isaacson & Daniluk, 2020). Half of all women in Pritchard et al.'s (2017) study saw EF

as fertile indemnity against not being able to acquire a partner and a further 39% saw it as security for the future. 59% of women in Hodes-Wertz et al.'s (2013) study considered it a back-up plan in the event of the inability to conceive naturally in the future, while a further 38% deemed it as a back-up plan and also a means to postpone reproduction. For others, managing their risks gave them a sense of security and peace, with Hodes-Wertz et al. (2013) reporting that 53% of their respondents stated an increased sense of security.

The ideal of the heteronormative nuclear and genetic family

It was clear throughout many of the studies that women appreciated the ideal of a heteronormative nuclear family and did not want to be a single parent but would prefer to raise children in a partnership (Baldwin, 2017; Baldwin, 2018; Carrolle & Krolokke, 2018; Inhorn et al., 2018; Yee et al., 2021). Furthermore 84.9% of women from Yee et al.'s (2021) study indicated a strong desire for motherhood and genetic relatedness with their child, with 58.3% unable to envisage adoption as being an option and nearly half could not foresee a rewarding life without children (49.4%). Although 50% of another study could contemplate the prospect of staying childless, 84% still wanted to have children, with 60% being open to adoption (Wafi et al., 2020). In Jones et al. (2020) 89% of women stated that having their 'own biological children was very important to them'. All the participants in Baldwin's (2018) study expressed endorsement of the nuclear family as a mother, father and biological children as the ideal.

Some women experienced grief and loss that their lives had not turned out as they had hoped with the ideal nuclear family. For these women freezing their eggs helped diminish the burden of dwindling fertility and bewilderment over how they had 'ended up' like this (Baldwin, 2020; Inhorn et al., 2018).

Buying options

Many women in the study conducted by Wafi et al. (2020), felt that by freezing their eggs they were 'buying time' to find the right partner, and even if they never used their eggs it gave them a sense of feeling relieved, while others felt it bought the option of increased probability (Kilic & Gocmen, 2018). 30% of the women in Pritchard et al.'s (2017) study were concerned about future fertility but did not want to conceive at that time, so were also 'buying time'. Women in Inhorn et al.'s (2018) study bemoaned the

scarcity of eligible men and turned to SEF to 'buy time', similarly Carrolle and Krolokke (2018) found their professional participants led unstable lives and moved around a lot, thus were buying time until they had finished their 'obligatory (public) service'. Women also found that SEF enabled them to prepare for motherhood in the future when they would be relationally, emotionally and financially stable (Pritchard et al., 2017)

Experiences

Seven subthemes were identified with respect to experiences of SEF: empowerment; loneliness, anxiety and stigma; overall satisfaction; managing expectations; cost; need for information and decision regret.

Empowerment

The sense of taking action, assuming control and a stronger sense of personal autonomy was reported in a number of studies and SEF was seen as an enterprising, responsible decision.

88.4% of participants in Yee et al.'s study (2021) felt self-empowered. Women felt empowered by taking control of their life, and felt that by taking responsibility for their goals and dreams it increased their chances of having a child in the future (Baldwin, 2018; Carrolle & Krolokke, 2018; Isaacson & Daniluk, 2020). It also gave them a greater sense of security (Hodes-Wertz et al., 2013). Over half of the participants in one study (Hodes-Wertz et al., 2013) believed SEF was empowering while another 36% agreed it was empowering but also anxiety producing. Some women found it a powerful and positive choice enacting their own bio-preparedness by freezing 'younger (presumably) healthier eggs' and found a reduced pressure to find a romantic partner (Carrolle & Krolokke, 2018).

Loneliness, anxiety and stigma

A common experience for women undergoing SEF was their unique circumstances of going through the egg retrieval process alone and feeling overwhelmed that they needed to do this on their own (Baldwin & Culley, 2020; Yee et al., 2021). Many women admitted to feeling that the process was more emotionally challenging than anticipated and if they were to undergo it again, would seek more social support and counselling, and be better prepared emotionally (Isaacson & Daniluk, 2020; Jones et al., 2020; Yee et al., 2021).

Another significant factor for some women was a sense of social stigma or of failure (Baldwin, 2020; Isaacson & Daniluk, 2020). Hodes-Wertz et al., (2013) found 32% of their participants felt social stigma surrounding their experience, while Yee et al., (2021) found 44.7% believed there was a moderate to high stigma associated with undertaking SEF. Similarly in their study Seyhan et al., (2021) stated that 42% of participants found injections were the most difficult part of the experience and 35% found the most challenging aspect was anxiety generated by the procedures.

Overall satisfaction

Wafi et al. (2020) found 98% of women were highly satisfied with their procedure overall and 80% would consider doing it again if they could 'wind back the clock'. Yee et al. (2021) found 94.2% would recommend the process to their friends and family while Seyhan et al., (2021) found 98.8% would endorse the procedure, with 75.3% feeling satisfaction with the process overall. Additionally, Greenwood et al., (2018) reviewed participants feelings and found the majority (89%) were pleased they had frozen their eggs even if they never made use of them and 88% felt they had more options and control over their family planning. Most women had positive and hopeful experiences, were grateful for SEF, and praised it as a new fertility preservation option (Inhorn et al., 2019). Women from Isaacson and Daniluk's (2020) study felt fortunate with a 'sense of gratitude' that the process was easier than expected, and they were well cared for. They also revealed it reduced the pressure to find the right partner with whom to conceive naturally and they felt lucky to have access to this option.

Managing expectations

Seyhan et al. (2021) observed the overestimation of natural and IVF-assisted reproductive potential success with 51.9% of respondents very optimistic about the likelihood of a successful live birth despite having received comprehensive counselling prior to treatment which suggested lower likelihood of success. In contrast, Carrolle and Krolokke (2018) indicated women in their study were strikingly aware of the tentative realisation of achieving a pregnancy, but balanced the uncertainty with the reality of it at least being an option.

Wafi et al. (2020) mentioned physical side effects were recollected by just seven percent of women in their study, however this was a retrospective study so there may be some bias. Women who were part of Baldwin and Culley's (2020) study understood

risks of the EF process as minimal and viewed it as merely 'half' the IVF process and therefore less risk. They labelled side effects such as a bloated stomach, water retention and tiredness as 'minor' and were able to manage them given the anticipation of a potential child.

Isaacson and Daniluk (2020) argue that women want and need knowledge about their fertility status in order to manage their expectations. Likewise, Inhorn et al. (2019) suggest information is central to women's management of their prospects, and Jones et al. (2020) concur that in this reproductive gamble, realistic counselling is vital to ensure realistic expectations (especially with respect to the risk of treatment failure).

Cost

Wafi et al. (2020) found 68% of their respondents would have undergone more cycles if the process was cheaper, while 43% of women in Seyhan et al.'s (2021) study indicated they did not have enough eggs frozen and wanted to undergo another cycle, however the cost was prohibitive for 59% of that group. Many studies indicated women were aware of the financial outlay and commitment involved in freezing their eggs and were willing to invest in their future, and some felt affordability would increase accessibility for SEF to all women (Hodes-Wertz et al., 2013; Inhorn et al., 2019; Killic & Gocmen, 2018). Participants in Carrolle and Krolokke's (2018) study saw the cost as an investment while those with employer-sponsored benefits or insurance received partial contributions but were still mindful of the financial commitment.

Need for Information

Inhorn et al. (2018) suggest the greatest desire for women undergoing SEF was for detailed information from competent and diverse staff who were sensitive to the needs of single SEF women (Inhorn et al., 2019). They also needed honest guidance and patient-centred care about exactly what to expect from an egg freezing procedure based on their age and fertility profile. Comprehensive details to allay doubts and concern, with specific 'instructional materials' that could be viewed at home, such as videos about self-injecting for women only rather than couples, were deemed vital.

Counselling was considered crucial to cope with expectations especially the risk of failure and those who had a poor perception of their counselling seemed to be more

prone to regret (Jones et al., 2020). Nevertheless Yee et al., (2021) found most women in their study felt they had made an informed decision and were 'fairly confident' about the pros and cons of SEF. Similarly, Jones et al. (2020) found that 83% of their respondents reported they were aware of the chances of treatment failure, with 13% unsure and 4% felt this was not explained well enough. Women were also reported to ask for more information about the financial outlay, ways of payment and ongoing costs (Inhorn et al., 2019). They suggested there was a need for access to information regarding fertility decline at a younger age and wished they had known earlier about the option of oocyte cryopreservation (Isaacson & Daniluk, 2020).

Decision regret

Greenwood et al. (2018) reported that 49% of women experienced decision regret (33% claimed mild regret and 16% reported moderate to severe regret). A 4-fold increase in regret was seen in women who ended up with less than 10 oocytes cryopreserved compared to those with more than 10. Using univariate logistic regression analysis Greenwood et al. (2018) also identified that women's perceived adequacy of emotional support and perception of attaining a live birth were associated with moderate to severe regret.

Wafi et al. (2020) found 39% of their respondents regretted not undergoing more cycles, while 54% of women in Seyhan et al.'s (2021) report regretted not freezing their eggs earlier.

Yee et al. (2021) found the majority (60.5%) of women would have repeated the experience exactly the same way again and only 4.7% would have made a complete change. Almost 35% would have made some changes such as seeking more social support, freezing their oocytes earlier or completing another cycle (Yee et al., 2021).

Discussion

This systematic review provides an up-to-date analysis of women's motivations for and experiences of egg freezing for social reasons. Thirteen studies were reviewed with the key motivation reported as a perceived lack of a suitable partner, in addition to egg freezing being seen as a means for creating a back-up plan to safeguard against age-related fertility decline. Satisfaction with the process was typically reported, with the experience regarded as empowering. Loneliness and anxiety were however also noted as common experiences and, alongside the costs of egg freezing and the difficulty in

managing expectations, made SEF a demanding experience. The majority of women across the studies in this review were in their late thirties which aligns with information from New Zealand figures for Fertility Plus (a private and public service provider falling under the Auckland District Health Board), whose average age of single women undergoing SEF is reported as 36.2 years (2016-2021) (J. MacKenzie, personal communication, October 19, 2021).

At the time of writing, only one other review on social egg freezing was identified, that of Platts et al. (2020). This systematic review explored attitudes, knowledge and intentions to use oocyte cryopreservation for non-medical reasons and gathered views of the general public alongside those of women undergoing EF, but did not address women's experiences of SEF. To my knowledge the current review is the first to attempt to synthesise understanding of both motivations and experiences of women and to focus specifically on those who have undergone SEF. Thematic synthesis of the thirteen studies main outcomes in this review highlights a number of additional findings.

Motivations

Over 80% of women who underwent SEF in studies included in this review were single and cited lack of what they perceived to be a suitable partner committed to raising children within a heteronormative nuclear and genetic family, as the paramount reason for freezing their oocytes. This appears to be an international trend, given the range of data collection sites covered by this review, including the UK, the USA, Turkey, Belgium, Canada, Israel and Australia. This finding seems to suggest that women are freezing their eggs in anticipation of finding a partner willing to parent (Hammarberg et al., 2016). A literature research suggests no studies to date have been conducted in Aotearoa to explore women's motivations for SEF in New Zealand and this is a gap in current research.

A common misconception in the public domain is that women are freezing their eggs for career-related purposes and are prioritising career over family goals (Atler, 2015), however the synthesis of these thirteen studies overwhelmingly suggests this is not the case. Indeed, one article (Inhorn et al., 2018) reported that career planning was one of the least common pathways to SEF while Jones et al. (2020) suggest only 28% of their participants were influenced by career aspiration with 59% stating it was not a consideration at all. Instead, women were reported to pursue SEF due to relationship

hurdles, such as their perception of a lack of a suitable partner or a partner willing to start a family, rather than career intentions (Inhorn et al., 2018). This review suggests motivations for SEF are more to do with individual circumstances not aligning with the desire for motherhood, and women undergo SEF to 'buy time' and avoid childlessness in the future (Johnston et al., 2021). Research by Mills et al. (2011) suggests modern societal attitudes and cultural factors such as partnership variations, a rise in women's education and economic insecurity may impact on the timing and postponement of parenthood, rather than just career based influences.

Most of the women undergoing SEF in the studies in this review were in their late thirties and motivated by a sense of time pressure with respect to their fertility, a sense heightened by the absence of what they perceived to be a suitable partner with whom to have a family at that time. These findings make sense given that age is known to be a significant factor associated with fertility, with women under the age of 30 having approximately a 25% chance of natural conception, and rates dropping to just 12% by age 37 and 5% at age 42 (ASRM, n.d). Pregnancy and childbirth complications also tend to escalate with increasing age (Carolan, 2015; Sydsjö et al., 2019). Freezing their eggs then, was construed by many women in the studies included in this review as a back-up plan similar to an insurance policy. Women were grateful for the security of another option for family-building at a later time in their lives, even if they never used it. Some women maintained that SEF gave them a sense of optimism, security and peace (Inhorn et al., 2020; Kilic & Gocmen, 2018).

In addition to the relationship between age, fertility and pregnancy outcomes, however, the optimal age to freeze eggs is also age-related, with the best age to freeze eggs being in a woman's late twenties to early thirties before the quality and quantity of their eggs has declined. Therefore, storing eggs at a younger age would thus also optimise outcomes. However, many women of a younger age do not actively consider or are unaware of their fertility and the limits thereof (Delbaere et al., 2020; Pedro et al., 2018). Further, even if women are encouraged to store their eggs at younger ages, such as in their twenties, many countries, including NZ, have imposed storage limits on gametes and embryos, which means that women may find themselves in a position of not being able to use the eggs they froze as a safeguard to future declining fertility. In NZ this is currently set at 10 years (ACART, n.d.; Fertility Associates, n.d.).

For many women in the studies included in this review, the heteronormative nuclear and genetic family was constructed as the ideal and they froze their eggs in an attempt

to 'buy time' and establish this for themselves in the future. This social construct assumes binary gender with heterosexuality referring to the 'norm' of a male and female, and genetic denoting biological children. The importance of this social construct may reflect the age and demographics of the women undergoing SEF in these studies, and as such the motivations of younger generations may be found to be different as societal norms change. For example, results from the General Social Survey (GSS) conducted in NZ in 2018 show that more than any other age group 18–24 year olds were more likely to identify as bisexual or gay/lesbian (Statistics New Zealand, n.d.). Also, more women are staying single, therefore in the coming years perhaps the issue may be less about the absence of a male partner as more women seek egg freezing as a means to conceive with a same-sex partner and broader definitions and social constructs of 'family' are established. However, these women will still need a sperm donor to build a family and the current wait time in New Zealand is approximately two years, and thus this, alongside age-related fertility decline and absence of a partner with whom to build family, may emerge as a motivation for SEF (Fertility Associates NZ, n.d.). Four of the studies in this review (Greenwood et al., 2018; Inhorn et al., 2018; Wafi et al., 2020; Yee et al., 2021) record inclusion of lesbian and/or bisexual women, but they account for less than 5% of the study population and it is not clear whether this is an accurate reflection of women undergoing SEF or if selection for these studies was biased towards certain demographics. Yet, the studies in this review convincingly suggest that women use SEF in order to sidestep making a decision about family-building through other means such as a sperm donor, in hope of following the path they wish for which is predominantly heteronormative (Baldwin, 2018).

In challenging the assumption of a heteronormative ideal, is the drive to have a parenting partner a socially construed concept? Bengtson and Allen (2009) argue that life course perspective and concepts, such as life course transitions and diversity, the interplay between lives and historical time and age norms, give important insights into relationships, family structure and cultural schemas as they change over generations. Life course expectation is principally relevant to SEF and reproductive delay, with all participants in Baldwin's (2018) study holding firm ideals regarding their expectations of pursuing motherhood with a life partner. Similarly, seven other studies in this review also indicated these same beliefs (Carrolle & Krolokke, 2018; Inhorn et al., 2020; Isaacson & Daniluk, 2020; Jones et al., 2020; Kilic & Gocmen, 2018; Pritchard et al., 2017; Yee et al., 2021). The theory of social constructionism argues that the way society gives meaning to a certain phenomenon is constructed by points of views

presented to them through avenues such as magazines and media (Francis-Connolly, 2003). This theory would argue that women are buying into a stereotypical view of wanting to have a partner to have children and an idea that they need to fulfil those needs. Do women want to have a partner because of social reasons or because it is practical? The studies in this review point towards women conforming to this 'heteronormative ideal' and although this construct could be challenged, pragmatically if this is what women want, then that is very real for them.

Similarly, in the studies reviewed, women seem clearly invested in having a genetic child. Western society and its description of parenting has a colourful history of placing great worth in 'blood' ties (Freeman et al., 2014; Hendriks et al., 2017). This notion has been challenged by social vicissitudes such as the decline of marriage and bolstered by fresh approaches to family-building concepts and fertility treatment (Freeman et al., 2014). Countries differ in their attitudes towards the level of significance of genetic parenthood, for example 35% of the general public in Sweden versus 78% in Canada view genomic parenthood as important, with one of the main motivators being to 'experience a natural process' or share a biological tie with their children (Hendriks et al., 2017). This review reinforces that the majority of women desire genetic continuity, with other forms of family-building seen as secondary or less favourable options (Baldwin, 2017; Carrolle & Krolokke, 2018; Jones et al., 2020; Yee et al., 2021). As suggested by Waldby (2015) women in this review are freezing their eggs to buy time to create offspring genetically linked to them and a prospective future partner.

Experiences

The women in the thirteen studies included in this review reported overall satisfaction with their experiences of SEF in spite of the financial outlay and considerable costs associated (Wafi et al., 2020). The studies indicated that women felt a sense of relief and reported that they had avoided a potential sense of regret and blame in the future. In spite of the cost, anxiety, loneliness and stigma, the studies highlighted that uncertainty about the future was replaced with a feeling of hope, a sense of fulfilment and relief (Carroll & Krolokke, 2018).

Lazarus and Folkman's transactional theory of stress and coping proposes that individuals utilise behavioural and cognitive strategies to manage internal and external demands to deal with stressful situations that exceed their resources (Lazarus and Folkman, 1984). One of the main ways of coping in both males and females

undergoing fertility-related challenges is by taking direct action, and to be 'actively engaged in pursuing treatment' (Edelmann et al., 1994). Moore (2016) agrees a sense of agency can help individuals face a difficult or uncertain future, therefore SEF in the face of uncertainty regarding future fertility and relationship status, and particularly in the uncertain time of a global pandemic, may help to establish a sense of control by taking action. Interestingly, SEF in NZ is reported to be on the rise including during the COVID-19 pandemic – an increase ascribed to people's reassessment of life goals (including when to start a family), the fact that for some the pandemic has led to unexpected additional disposable income and more flexibility in terms of time to attend clinic appointments, and a desire to exert some control over the future (J. Copeland, President and Chair of Fertility NZ, personal communication, October 19, 2021). Similarly, New York University's Langone Fertility Centre reported a 41 per cent increase in women freezing their eggs in 2020, compared with the same time period in 2019 and this included a closure of three months induced by the pandemic (Glass, 2020). The centre's director, James Grifo argues that freezing eggs might be about restoring a sense of control during uncertain times which aligns with the empowerment theme identified in this review (Glass, 2020).

However, decision regret, loneliness and anxiety were also reported in this review (Seyhan et al., 2021; Wafi et al., 2020; Yee et al., 2021). Greenwood et al. (2018) and Jones et al. (2020) suggest that a poor perception of counselling support increases decision regret about undergoing SEF, and that therefore effective and appropriate counselling is of great importance throughout the SEF process. For example, health care workers need to raise awareness of expected probabilities regarding egg retrieval and predicted live birth rate, along with the possibility of requiring more than one cycle (Greenwood et al., 2018; Jones et al., 2020). In terms of regret, it is possible that the worst form of regret may happen not at the SEF stage, but later during the IVF stage if this fails. Therefore, a woman's potential regret may be more pronounced many years in the future. Counselling that incorporates a realistic appraisal of failure is important to help manage expectations, especially the risk of treatment failure and an overestimation of success.

Research indicates anxiety and loneliness are reported in other areas of ART as well, with the treatment process of IVF one of the most anxiety inducing elements alongside the unpredictability of results (Centre of Perinatal Excellence [COPE], (n.d.); Mori et al., 1997; Verhaak et al., 2007). The impact of support groups and counselling in addressing anxiety, loneliness and stigma are considerable when dealing with the

effects of infertility (Fertility NZ, n.d.; Patel et al., 2018). Similarly, Mitrovic et al. (2021) report perceived relationship satisfaction and social support are factors in predicting positive and negative affect during IVF, and Abdollahpour et al. (2021) report that cognitive behavioural therapy (CBT) is beneficial for those suffering high levels of anxiety and depression as a result of infertility. This affirms the need for support for those undertaking SEF also. Further, alongside counselling, education may help manage expectations, for example, Seyhan et al. (2021) suggest that visual information such as graphs illustrating the actuality of the quantity of eggs needed to attain one euploid blastocyst be used to give women realistic and easy-to-recall medical information about the limits of SEF.

Indeed, the Royal College of Obstetrics and Gynaecologists (RCOG) released a cautionary statement in 2018 highlighting that SEF does not 'guarantee success' (RCOG, 2018). In addition, Leridon and Slama (2008), reported that delaying primary pregnancy by 2.5 years reduced fertility by 5.2%, and when delayed by 5.6 years, fertility dropped 11.9%. Similarly, Te Velde et al. (2012) reported that perpetual involuntary childlessness had doubled since the 1970s as a consequence of delayed mothering in six European countries. These statistics suggest greater efforts are needed to ensure better education about women's declining fertility. Indeed, findings from a study by Lucas et al. (2015) of 724 New Zealand university students suggested that while students were able to identify that female fertility decreased with age, they significantly overestimated the chances of a woman naturally becoming pregnant at any age, as well as considerably overestimating pregnancy from IVF methods. The need for education applies to both men and women as Hammarberg et al. (2017) report that most men overestimate when women's fertility starts to decline and do not feel the urgency to settle down and procreate. They argue that health promotion is needed to increase men's understanding of women's fertility, a recommendation supported by Jamieson et al. (2010) who suggest that men end up reducing women's fertility by delaying partnering and parenting. Future research could explore men's knowledge of factors concerning women's fertility, investigating barriers that men face, attitudes about gender roles and discussions concerning reproductive planning (Hammarberg et al., 2017). At present SEF and fertility issues are not usually discussed in high school sex education in New Zealand. Findings in this review suggest it may be valid to pursue further research regarding the impact of educating younger people and the general public about women's declining fertility and the restricted efficacy of ARTs.

The consideration of cost for SEF was also reported in this review with some women indicating it prohibited them from undergoing more cycles (Seyhan et al., 2021; Wafi et al., 2020). In New Zealand one cycle can cost between \$7,000–\$12,000 plus yearly storage fees, with older women potentially needing more than one cycle to achieve viable eggs (Fertility Associates, n.d.). Given that NZ's fertility rate dropped to a new low of 1.61 births per woman in 2020, substantially less than the 2.1 required for population replacement, alongside declining fertility rates across the developed world, there could be demand for state support of SEF as part of public healthcare or company funding (Statistics NZ, n.d.; Nargund, 2009; Volleset et al., 2020). Johnston et al. (2021) found that 42% of Australians believed it would be suitable for employers to offer oocyte cryopreservation as a job perk. If this option were available in New Zealand it might increase the rate of SEF in Aotearoa, as cost is normally prohibitive.

Recommendations

The findings from this systematic review have significant implications for SEF policy and practice generally, as well as in relation to the NZ context. Primarily, fertility education for young people and adults needs to be made a priority to counteract future infertility. Essential information regarding a woman's declining fertility is vital to avert using SEF at a less than ideal age for successful outcome, or as a last resort for parenthood (Platts et al., 2020). With reference to NZ, information about SEF is provided by both the major clinic providers (Fertility Associates, Repromed, Fertility Plus), and the consumer support organisation Fertility NZ. Fertility Associates (n.d.) has a specific pathway for egg freezing with detailed information about fertility preservation and fees. Similarly, Repromed (n.d.) offers honest, clear information about SEF, including the possibility that 'no eggs may be collected or suitable for freezing despite everyone's best efforts'. Fertility Associates (n.d.) also suggest that women bring a support person during the egg collection procedure, which may alleviate one of the issues identified in this review, that of loneliness and anxiety during the process.

Public health education and raising awareness around SEF may also help to reduce stigma. Further research could be undertaken regarding women's experiences of this at fertility clinics in Aotearoa. A potential consideration is making information available to younger women so they are aware of declining fertility and might choose to freeze their eggs at a younger age, thus increasing their prospects of a live birth. It is imperative that women have access to counselling before, during and after SEF and

also when thawing oocytes for use, as this enables exploration of complex emotional responses and enhances coping mechanisms (Fertility NZ, n.d.).

Worldwide there are disparities in access to infertility treatment, including for example geographic accessibility, cost and availability (Dyer et al., 2020). These inequalities are highlighted with access to SEF in this study along with previous literature, indicating SEF is dominated by highly educated Caucasians in their late 30s (Inhorn et al., 2018). With reference to NZ, there is a need to address inequities in access. Local clinics were contacted to explore how they cater to single women and wahine Māori. Fertility Plus state their information is aimed at couples with no allowances for single women, neither do they have information in te reo Māori (J. MacKenzie, personal communication, October 19, 2021). While Repromed do not have separate practice policies for how to communicate with single women versus couples, they do use different consent forms for single women, and as yet, have no resources in te reo Māori (H. Nicholson, personal communication, October 26, 2021). Inequalities in the health system indicate bias in the way services are set up with institutional racism and systemic barriers meaning Māori are often excluded from access to health care (Poynter et al. 2017).

Cost is a significant barrier with figures from the 2019/20 NZ Health survey demonstrating Māori are 1.5 times as likely not to visit a GP than non-Māori and 2.8 times as likely not to collect a prescription due to cost (Ministry of Health, n.d.). It is hardly surprising then, that ethnicity data from Repromed and Fertility Plus show none of their social egg freezing over the past 8 years and 3 years respectively, has been for wahine Māori (J. MacKenzie, H. Nicholson, personal communication, October 19, 2021, November 9, 2021). This is concerning and suggests SEF is not utilised by Māori and thus is an area that deserves further research to identify systemic and cultural barriers, such as cost and lack of culturally relevant information, that may prevent wahine Māori from undergoing SEF.

UK policies have recently been updated allowing eggs to be cryopreserved for up to 55 years. According to Julia Chain, chair of Human Fertilisation and Embryology Authority [HFEA] (n.d.), this will allow women more flexibility and choice by enabling women to freeze their eggs at earlier ages, and for longer. Thus, one potential recommendation is to ensure women can store their eggs at younger ages, thereby potentially improving the success rates of SEF. However, the ethical and psychosocial implications of this are far-reaching, with potential for an 'age-gapped' family, with genetic siblings

separated by generations and the possibility of an even older cohort of parents (Woodward & MacDuffie, 2016). Dr Mary Birdsall (Fertility Associates, NZ. n.d.) reasons that New Zealand's 10-year storage limit is appropriate, with extensions regularly granted approval.

Finally, the implications of this research acknowledge SEF is empowering and offers women greater reproductive choice but also buys into the socially constructed stereotype that motherhood is required for women's self-fulfilment. These constructed assumptions and norms may lead to feelings of stigma, guilt and shame if women choose childfree living as an option (Mcquillan et al., 2012; Peterson, 2015; Stahnke et al., 2020). However genetic parenthood may be especially valued in the NZ context given the importance of whakapapa and connection with tūpuna - 'ko wai au?' 'who am I?' and 'no wai au?' 'from whom do I come?' (MacKinnon, 2017; Mahuika, 2019) thus further research into the reflections of New Zealand women is warranted.

Limitations

Four areas of limitation can be identified in this review. Firstly, the quality of the thematic synthesis may be impacted by researcher bias as the author was predominately working independently. Despite the intention to maintain objectivity in coding and extracting data, multiple reviewer objectivity could have reduced potential for bias in terms of the thematic synthesis. Additionally, the quality of the synthesis is integrally limited by the reporting and quality of the primary studies. The Critical Appraisal Skills Programme [CASP] (n.d.) was utilised as an appraisal tool to ascertain quality, trustworthiness and relevance of the studies included. The results of this indicated that the majority of the thirteen studies did not examine the researcher's reflexivity or bias. The relevance of a study's findings to clinical practice is essentially based on the evaluation of how well a study has been conducted and reported (Harrison et al., 2017). Therefore, the use of the CASP (n.d.) tool in this study is a factor in the reliability and validity of the results. Thomas and Harden (2008) found in their review that better quality papers contributed more to their study than those of poorer quality, however the current systematic review found the majority of papers supplied equally useful information regarding women's motivations and experiences, with the exception of Inhorn et al's. (2020) smaller ethnographic study about religious standpoints.

A second limitation is that some pertinent references may not have been identified by the search strategies and terms used in this review, and therefore may not have pinpointed every option, however the studies selected are representative of studies for the search terms used. The author is confident a good set of search terms were used to find research specifically connected to the research question, nonetheless, there may be related research that could shed further light on additional aspects of the topic that have not been included here.

Thirdly, the included studies varied in terms of their sampling, methods and methodology. For example, the inclusion of three retrospective studies could bring an element of recall bias into women's responses with a propensity to overestimate and/or underestimate negative or positive experiences (Columbo et al., 2020). Likewise, many of the studies included in the current review had relatively small sample sizes, thus, women who chose to participate in the studies could be biased either favourably or negatively to the SEF process, with the possibility of stronger opinions.

Finally, this review contained several reports that referred to the same study. Attempts were made to mitigate this by combining them as one unit of interest, however this is still a limitation.

Conclusion

In summary, this systematic review set out to provide an overview of existing literature on women's motivations for and experiences of SEF. Findings indicated that motivations for SEF were not attributed to pursuing a career, as seems to be the dominant public perception, but were predominantly attributed to the absence of a suitable partner with whom to create biological children and to avoid the effects of age-related fertility decline. The fundamental themes in the study findings also suggest the affective sentiments of relief, a heightened sense of control and reduction in anticipatory regret are valuable contributors to the overall satisfaction of women who freeze their eggs. These benefits outweighed the noted disadvantages in the literature of loneliness, anxiety, the sometimes prohibitive cost and the potential for regret at having undertaken the procedure. The experience of EF appears to be associated with a sense of empowerment and gratitude in having a back-up plan, even if it might not ultimately be successful.

The findings from this systematic review have significant implications for understanding how New Zealanders might be educated about SEF, particularly in terms of ensuring both women and men are equally aware of age-related fertility decline and given earlier information. It is hoped that this review might help clinicians and researchers to expand client centred care and resources for women pursuing SEF. Ensuring appropriate systems, services and support should continue to be a priority for future developments in NZ. This study lays the groundwork for future qualitative research into the lived experiences of women in Aotearoa New Zealand undergoing the process of social egg freezing.

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